DOE Operational User Requirements and Dispersion Modeling Capabilities

DOE Chemical & Biological Nonproliferation Program: Modeling and Prediction

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Workshop on
Multi-scale Atmospheric Dispersion Modeling
within the Federal Community

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DOE Dispersion Modeling Operational Activities

- **Facility Safety Analysis**
  - Determine potential consequences of a facility before construction or modification; use during operation for risk assessment
- **Facility Emergency Preparedness and Response**
  - Develop hazard assessments, emergency action levels, and modeling systems to use in emergency response
- **Deployable Assets for Emergency Response (ARG, FRMAC, NEST, JTOT)**
  - Resources to protect public from major radiological accidents and terrorist events
- **Facility Annual Environmental Reporting**
  - Document exposure to public from routine operations

DOE Dispersion Modeling Operational Activities

Activity - Description	Authority or Requirement	Guidance	Dispersion Modeling Approach
Facility Safety Analysis	DOE Order 5480.23 (1997), NRC NUREG-1320 (1988) & CR-6410 (1998)	DOE-STD-1027-92 & 3009-94, DOE-HDBK-3010-94, NRC Reg. Guide 1.145 (1983), Accident Analysis Guidebook (2000), Accident Phenomenology & Consequence (APAC) Working Group Reports (1997-2000)	Graded approach – Model complexity commensurate with complexity or scale of effect, i.e., simple Gaussian to complex 3-D numerical codes
Facility Emergency Preparedness & Response	DOE Order 151.1 (1997, currently under revision)	DOE Guide 151.1 (1997, currently under revision), DOE Modeling Resources (1995)	Graded approach – Model complexity commensurate with complexity or scale of effect, i.e., simple Gaussian to complex 3-D numerical codes
Deployable Assets for Emergency Response (ARG, FRMAC, NEST, JTOT)	Federal Response Plan (FRP, 1995), Presidential Decision Directive 39 (PDD 39, 1995)	Federal Radiological Emergency Response Plan (FRERP, 1996), Overview of FRMAC Operations (2000), DoD Nuclear Weapons Accident Response Procedures (NARP, 1995)	Graded approach – Deployed teams use local models in the field and reach back to NARAC models
Facility Annual Environmental Reporting	DOE Orders 5400.1 & 231.1, CERCLA, SARA Title III, Natl. Emission Stds. for Haz. Air Pollutants (NESHAPS) 40 CFR 61	EPA Model Guideline	EPA annual model

DOE Dispersion Models Used Within DOE

Activity	Technical Forums	Dispersion Models Used	
Facility Safety Analysis	DOE Energy Facility Contractors Group Safety Analysis Working Group (EFCOG SAWG) www.sawg2000.org	Radiological models: AI-RISK AXAIR89Q BNLGPM COSYMA ERAD ETMOD GENII GXQ HOTSPOT MACCS2 MATHEW/ADPIC PAVAN RSAC 5 TRAC RA/HA UFOTRI	Chemical models: ADAM ALOHA CALPUFF CASRAM FEM3 HGSystem INPUFF SLAB SCIPUFF TSCREEN
Facility Emergency Preparedness & Response	DOE Emergency Management Issues Special Interest Group (EMI SIG) http://www.orau.gov/emi/ DOE Subcommittee on Consequence Assessment and Protective Actions (SCAPA) http://www.scapa.bnl.gov/	ALOHA (NOAA; National Safety Council) CAPARS (Hodgin, AlphaTrac) Epicode (Homann Associates) ERAD (Boughton, Sandia Natl Lab) HOTSPOT (Homann, LLNL) MDIF-VIS (NOAA ARL, INEEL) MIDAS (PLG) NARAC - ADAPT/LODI (Sugiyama & Nasstrom, LLNL) PGEMS (Allwine, PNNL) WINDS (Savannah River Lab)	
Deployable Assets for Emergency Response (ARG, FRMAC, NEST, JTOT)	ARG, FRMAC, NEST, JTOT Working Groups http://www.dp.doe.gov/emergencyresponse/ http://www.nv.doe.gov/programs/frmac/	Local models used in the field: HOTSPOT, ERAD Reach back to NARAC models: ADAPT/LODI	
Facility Annual Environmental Reporting	EPA SCRAM & Modeling Conferences http://www.epa.gov/scram001/	CAP-88	

DOE Dispersion Modeling Capabilities
Graded Approach

Hotspot Health Physics Codes

Deployed to emergency response personnel

SNL Atmospheric Dispersion and Consequence Prediction Capability

Deployed with expert atmospheric dispersion scientist

LLNL National Atmospheric Release Advisory Center (NARAC)

Reach-back to national center with expert assessment staff

DOE CBNP
Modeling and Prediction

Chem-Bio Transport and Fate in Urban Environments

Argonne National Laboratory
Lawrence Berkeley National Laboratory
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
Pacific Northwest National Laboratory
Sandia National Laboratories

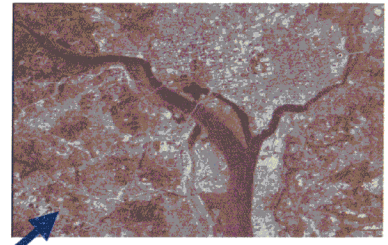
Department of Energy
Chemical & Biological Nonproliferation Program

Goal
Modeling and Prediction

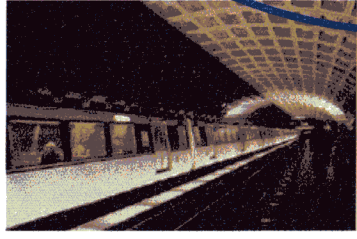
Building Interiors

"...to accurately predict the dispersion and ultimate fate of chemical and biological agents released into the urban environment..."

Urban-Regional



Subway



Multiple Interacting Scales

Exterior Building

Counterterrorism Incident Response in Urban Areas and at Special Events